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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/064,529	07/24/2002	Peter Speier	20.2817	8343
23718	7590	01/16/2004	EXAMINER	
SCHLUMBERGER OILFIELD SERVICES 200 GILLINGHAM LANE MD 200-9 SUGAR LAND, TX 77478			SHRIVASTAV, BRIJ B	
			ART UNIT	PAPER NUMBER
			2859	

DATE MAILED: 01/16/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/064,529	SPEIER, PETER	
	Examiner	Art Unit	
	Brij B Shrivastav	2859	MW

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 November 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-42 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 42 is/are allowed.
- 6) ☐ Claim(s) 1-28 is/are rejected.
- 7) ☒ Claim(s) 29-41 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 August 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
 1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: |

DETAILED ACTION

1. Applicants amendment dated November 6, 2003 has been received and entered. Examiner appreciates for pointing out typographical error for claim 29 written as claim 16.
2. The present amendment is incomplete. Though claims 30-36, 38 and 39 are amended, however, are listed as original claims. .
3. Applicant's arguments with respect to rejection of claims 1-28 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 3, 6-14, 18, 19-21 are rejected under 35 U.S.C. 102(b) as being anticipated by Edwards et al (US 6,111,409).

As regards to claim 1, Edwards et al teach a nuclear magnetic resonance instrument including a housing to move in a well bore through earth formation (figure 1, numeral 116), with a magnet disposed in the housing adapted to induce a selected static magnetic field in the zone of interest (figure 3, numeral 2). The instrument has means to induce radio frequency magnetic fields in the zone of interest at a first frequency, a resonance frequency of a first nucleus, at a selected magnetic field strength, and at a second frequency, a resonance frequency of a second nucleus, at the

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selected magnetic field strength (figures 3, 5 and 6, numerals 16A and 16B; column 3, lines 5-24), wherein the first nucleus is different from the second nucleus (column 12, lines 29-58). The instrument also has means for inducing a radio frequency magnetic field according to a selected pulse sequence in the zone of interest, which is operatively coupled to the antenna assembly, and has means for detecting nuclear magnetic resonance signals at the first frequency, which is also operatively coupled to the antenna assembly (figures 5 and 6, column 9, lines 9-25 and column 12, lines 29-58).

As regards to claim 16, Edwards et al teach a nuclear magnetic resonance instrument including a housing to move in a well bore through earth formation (figure 1, numeral 116), with a magnet disposed in the housing adapted to induce a selected static magnetic field in the zone of interest (figure 3, numeral 2). The instrument has means to induce radio frequency magnetic fields in the zone of interest at a first frequency, a resonance frequency of a first nucleus at a selected magnetic field strength, and at a second frequency, a resonance frequency of a second nucleus at the selected magnetic field strength (figures 3, 5 and 6, numerals 16A and 16B; column 3, lines 5-24), wherein the first nucleus is different from the second nucleus (column 12, lines 29-58)). The instrument also has means for detecting nuclear magnetic resonance signals at the first frequency, (figure 5, column 9, lines 9-25 and column 12, lines 29-58).

As regards to claim 3, Edwards et al teach second nucleus as carbon-13 (see abstract).

As regards to claims 6-8 and 17, Edwards et al teach the zone of interest is the earth formation surrounding the well-bore; the housing is adapted to be lowered into the borehole on an electric cable; the housing forms a part of the drilling tool assembly (figure 1)

As regards to claim 15, Edwards et al teach CPMG pulse sequence to be used in earth formation exploration (figure 6, column 10, lines 18-26).

As regards to claims 19-21 Edwards et al teach magnetic resonance imaging instrument producing a static magnetic field of a selected magnetic field strength in a zone of interest (figure 3). The instrument has an antenna, which is adapted to resonate at a frequency corresponding to the frequency of a non-proton nucleus (figure 3, numeral 16; a carbon-13 nucleus). Further, the instrument has means to produce a radio frequency magnetic field according to a selected pulse sequence in the zone of interest, and to operatively couple it with the antenna (figures 5 and 6), and means to detect nuclear magnetic resonance signals (figure 5, numeral 20). Edwards et al also teach a housing adapted to move in a well-bore in the zone of interest in earth formation, which is a part of the sampling tool (figure 1, numerals 116-118) and teach a CPMG pulse sequence (column 10, lines 14-43).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

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invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Edwards et al et al (US 6,111,409) as applied to claim 1, in view of Kleinberg (US 6,346,813).

As regards to claim 2, Edwards et al do not specifically teach the first nucleus is a proton. Kleinberg teaches first nucleus as a proton. It would have been obvious to one of ordinary skill in the art to adapt Kleinberg's teaching with the teaching of Edwards for analyzing proton (hydrogen-1) thereby estimating water content in the rock formation hydrocarbons.

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Edwards et al (US 6,111,409) as applied to claim 1, and further in view of Fiat (US 6,294,914).

As regards to claim 4, Edwards et al do not teach oxygen-17 as a second nucleus for magnetic resonance imaging. Fiat teaches oxygen-17 as a second nucleus for magnetic resonance imaging (see abstract, figures 13 and 14). It would have been obvious to one of ordinary skill in the art to adapt teaching of Fiat to use oxygen-17 as second nucleus with the teachings of Edwards et al to further improve and increase capabilities to find presence of hydrocarbons by analyzing oxygen-17 in the earth formation.

Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Edwards et al (US 6,111,409) as applied to claim 1, and further in view of Emsley et al (US 6,184,683).

As regards to claim 5, Edwards et al do not teach phosphorous-31 as second nucleus for magnetic resonance imaging. Emsley et al teach phosphorous-31 proton

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having magnetic moment and can be used as second nucleus for magnetic resonance imaging (column 1, lines 49-65). It would have been obvious to one of ordinary skill in the art to adapt teaching of Emsley et al to use phosphorous-31 as second nucleus with the teachings of Edwards et al to further improve and increase capabilities to find presence of oil/gas by analyzing phosphorous-31 in the earth formation.

Claims 9 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Edwards et al (6,111,409), and further in view of Kleinberg (US 6,346,813).

As regards to claims 9 and 18, Edwards et al do not further teach housing as a part of the formation fluid sampling tool. Kleinberg teaches housing as a part of formation fluid sampling tool (see abstract, figure 2). It would have been obvious to one of ordinary skill in the art to adapt Kleinberg's housing, which forms a part of the formation fluid sampling tool, with the NMR instrument of Edwards et al to make it more versatile to obtain and analyze the formation fluid samples.

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Edwards et al (US 6,111,409), and further in view of Doty (US 5,162,739).

As regards to claim 10, Edwards et al do not teach antenna assembly coupled to a double resonance circuit. Doty teaches a multi-tuned coil for NMR. It would have been obvious to one of ordinary skill in the art to adapt Doty's coil to be coupled with the antenna of the NMR instrument of Watanabe et al and Taicher et al to make the instrument more versatile to operate.

Claims 11-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Edwards et al (US 6,111,409), and further in view of Kunz (US 5,043,664).

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As regards to claims 11-14, Edwards et al do not teach the antenna assembly having the first and the second loop/saddle antenna disposed orthogonal to each other, and connected to a circuit to transmit first and second frequency. Kunz teaches the antenna assembly has the first and the second loop/saddle antenna disposed orthogonal to each other, and connected to a circuit to transmit first and second frequency (figure 1). It would have been obvious to one of ordinary skill in the art to adapt Kuntz's antenna assembly with the instrument of Edwards et al to record NMR signals with increased signal to noise ratio to improve chemical analysis of the fluid samples.

Claims 22-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kleinberg ~~et al~~ (US 6,346,813), and further in view of Watanabe et al (5,677,628).

As regards to claim 22 and 24, Kleinberg teach a method for determining a connate formation fluid property using a nuclear magnetic resonance instrument in a well-bore using a static magnetic field having a selected magnetic field strength in a formation fluid (figure 1, see abstract). Kleinberg, using nuclear magnetic resonance instrument, do not teach to acquire nuclear magnetic resonance measurements having *J coupling information, and to derive J coupling information from these measurements*. Watanabe et al, using nuclear magnetic resonance instrument, teach to acquire nuclear magnetic resonance measurements having J coupling information, and to derive J coupling information from these measurements (figure 83, columns 1 and 2; lines 5-67, 1-11).

It would have been obvious to one of ordinary skill in the art to adapt a method of Watanabe et al to the measurement information of Kleinberg to derive J coupling information on nuclear species present in the formation fluid samples to improve exploration techniques for commercially useful hydrocarbons in the earth formation.

As regards to claim 23, Kleinberg teaches withdrawal of connate fluids in the samples from earth formation surrounding the well-bore (figure 1).

As regard to claims 25 and 26, Kleinberg teaches use of CPMG in various forms to acquire fluid analysis (column 1, lines 15-21).

As regards to claims 27 and 28 Kleinberg further does not teach homonuclear and heteronuclear J couplings, and various combinations of pulse sequences, and Fourier analysis . Watanabe et al teach homonuclear and heteronuclear J couplings, and various combinations of pulse sequences and Fourier analysis to achieve data on J couplings, thereby obtaining much needed information to improve signal to noise ratio for the data obtained using collected samples (column 1, lines 5-65, column 2, lines 1-48).

Allowable Claims

6. Claims 29-41 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

7. Claim 42 is allowable, because the prior art of record does not teach a method for estimating a volume fraction of oils in earth formation fluids, using nuclear magnetic resonance to acquire J coupling information of carbon-hydrogen nuclei in samples of

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earth formation fluids by comparing a total magnitude of the J coupling modulated part to a total magnitude of the NMR measurements.

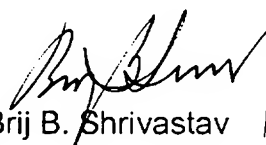
8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brij B Shrivastav whose telephone number is 703-305-0649. The examiner can normally be reached on 7 AM to 4 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diego F. F. Gutierrez can be reached on 703-308-3875. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9306 for regular communications and 703-304-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-0956.

Bbs

January 7, 2004



Brij B. Shrivastav

Patent Examiner